ELEMENT SIX: PERFORMANCE OF THE EXISTING SYSTEM

6.1 INTRODUCTION

The purpose of this element is to assess the performance of the existing Arizona state public-use aviation network. This assessment serves three purposes: (1) to assist in determining the relative strengths and weaknesses of the existing system within the context of generally accepted state and federal standards and guidelines; (2) to provide guidance in determining future systemwide aviation facility needs; and (3) to establish a baseline from which trade-offs among different investment strategies can be quantified over time.

As described in Element Two, SANS Methodology, the concept for assessing the aviation system and evaluating future investment scenarios, is one based on the use of performance measures. The performance measures represent the quantification of the goals and objectives identified at the beginning of the study. Three general categories of performance measures were developed: Facility, Service Level, and Economic Measures. The differences between each category are not distinct, but are useful for discussion purposes.

The Facility performance measures are general measures designed to assess the condition, or fitness, of the state's existing airport infrastructure in relation to some generally accepted industry standards. Service level performance measures, in relation to facility performance measures, were designed to measure the adequacy of the system in fulfilling its fundamental mission of the movement of people and goods. Economic performance measures provide some indication of the efficiency of the system and return on investment.

The performance measures listed below were identified and selected based on measures used in previous SANS studies, on comments from the Planning Advisory Committee (PAC), and through public input. For the purpose of this study, the individual performance measures have not been weighted; therefore, they are not listed in any particular order of importance.

Facility Performance Measures

1. The extent to which system airports meet ADOT Transportation Board aviation development and planning standards.

2. The number of airports with an annual demand less than 60 percent of runway annual service volume (ASV).

3. The number of airports experiencing delay to aircraft operations: the maximum and average delay in minutes an aircraft experiences due to airside congestion.

4. The number of airports that generate INM noise contours greater than 65 DNL that extend off airport property.

5. The number of primary airports without adequate utilities (electricity, telephone, water, sewer, and gas).

6. The number of airports with no close-in obstructions (within the 200 feet primary surface) and where all FAR Part 77 approach obstructions are marked (not including trees and roads).

7. The number of total airports in the state with no or minimal shared airspace and/or restrictions under visual/instrument flight rules. (VFR – Class A, B aircraft – IFR, Class C, D aircraft)

Service Level Performance Measures

8. Percent of communities in the State with a population greater than 5,000 within 60 minutes driving time of a commercial service airport.

9. Percent of communities in the State with a population greater than 1,000 within 30 minutes driving time of a general aviation airport.

10. Percent of communities in the State with a population greater than 15,000 within 30 minutes driving time of a general aviation airport that can accommodate large general aviation aircraft (ARC B-II) and has Instrument Meteorological Conditions (IMC) capability.

11. Percent of hospitals in the State within 30 minutes driving time of a general aviation airport with Instrument Meteorological Conditions (IMC) capability, on-site weather reporting, and jet fuel availability.

12. The number of major recreational areas in the state within 30 minutes driving time of a general aviation airport.

Economic Performance Measures

13. The dollar cost of average aircraft annual delay to Arizona airport system users.

14. Dollars of direct and indirect economic impact on the state from aviation.

15. The cost ratio of annual aviation infrastructure to total number of statewide annual enplaned passengers and annual aircraft operations.

16. The total dollar cost from aircraft delays associated with airspace congestion.

6.2 PERFORMANCE OF THE EXISTING SYSTEM

This section details the steps utilized in assessing the relative performance of the existing public use aviation system. Each of the performance measures are again described with a discussion of each individual analysis.

Facility Performance Measure 1

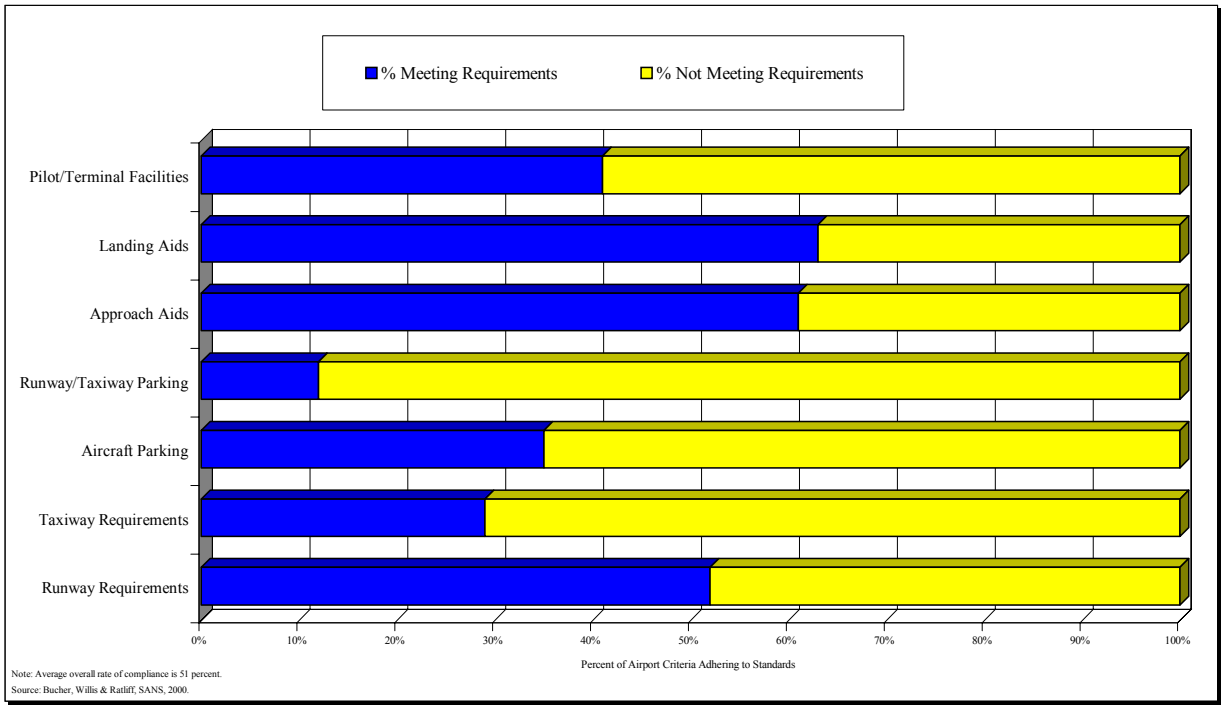
The extent to which system airports meet ADOT Transportation Board aviation development and planning standards.

Calculation

As described and presented in Element Four, Status and Condition, the condition of each facility being addressed in the SANS was determined by comparing the existing facility to basic design guidelines and standards appropriate to an airport's status. The standards used in determining the condition of the system were those developed by the ADOT. These development standards and planning guidelines are based on FAA airport planning and design advisory circulars with modifications and additions relevant to conditions particular to the State of Arizona.

The condition of the existing system of airports relevant to an individual facility's status and recommended state aviation development standards and planning guidelines pertinent to that facility are shown repeated from Element Four and are presented in Exhibit 6-1. On average, 51 percent of all airports are in adherence with key state and federal development and planning standards.

EXHIBIT 6-1: Airports Adhering to Key State and Federal Standards



Facility Performance Measure 2

The number of airports with an annual demand less than 60 percent of runway annual service volume.

Calculation
Capacity is an important indicator of system performance, and was also addressed in Element Four. Runway capacity was determined for every airport in the system and is shown in Table 6-1. Where possible, runway capacity as defined by the Annual Service Volume (ASV) was used, as reported by individual master plans and regional aviation system plans. Where no ASV was reported, it was calculated using the procedures described in FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.

The ASV for each airport was compared to 1998 annual operations to determine the annual volume to capacity ratio. The number of airports with annual airside delay greater than 60 percent was noted. The 60 percent capacity trigger was taken from FAA recommendations that suggest that planning for additional runway capacity should occur when activity approaches this level. This allows sufficient lead time so that facilities can be developed before a problem actually occurs.

The number of airports exceeding the 60 percent threshold was six (6). The state average ASV was 213,256.

Facility Performance Measure 3

The number of airports experiencing delays to aircraft operations: the maximum and average delay in minutes an aircraft experiences due to airside congestion.

Calculation
Average aircraft delay was calculated using FAA Advisory Circular 150/5060-5, Airport Capacity and Delay. Total annual aircraft delays for each airport were calculated as the average delay multiplied by the annual demand. These figures are also shown in Table 6-1.

The number of system airports experiencing delays was 23. The state average for aircraft delay was 0.50 minutes per aircraft, and the state average annual delay was 2,253 hours. Based on the demand/capacity calculations and on the existing operational conditions, three (3) airports in the state are above 100 percent capacity: Phoenix-Sky Harbor, Grand Canyon National Park, and Ernest A. Love Field in Prescott, while three (3) airports fall between the 60-100 percent demand to capacity ratio: Scottsdale Municipal, Tucson International, and Phoenix-Deer Valley Airports. These levels of activity would suggest that short-term capacity related improvements are warranted at these airports to enhance individual and overall system-wide capacity levels.

TABLE 6-1: *Existing Airport Capacity and Delay - 2000*

Facility Name	1998 Operations	Annual Service Volume	Volume to Capacity	Average Aircraft Delay Per Operation (min.)	Average Annual Airport Delay (hours)	Hourly Capacity	
						VFR	IFR
Ajo Municipal	1,900	175,000	1%	0.00	0	71	54
Avi Suquilla (NA)	N/A	175,000	0%	0.00	0	71	54
Bagdad	14,000	143,300	10%	0.00	0	55	39
Benson Municipal	N/A	123,284			0	50	30
Bisbee Douglas International	32,000	325,360	10%	0.00	0	140	56
Bisbee Municipal	3,020	147,600	2%	0.00	0	55	39
Bowie	850	120,000	1%	0.00	0	51	31
Buckeye Municipal Airport	16,020	245,000	7%	0.00	0	100	61
Casa Grande Municipal	65,400	285,000	23%	0.08	112	121	71
Chandler Municipal	153,800	269,000	57%	0.14	660	119	70
Chinle Municipal	900	120,000	1%	0.00	0	51	31
Cibecue	N/A						
Cochise College	45,250	267,000	17%	0.33	540	119	70
Cochise County	7,096	230,000	3%	0.00	0	98	59
Colorado City Municipal	3,680	110,700	3%	0.00	0	47	28
Coolidge Municipal	91,500	347,600	26%	0.08	234	147	57
Cottonwood Municipal	19,410	295,100	7%	0.00	0	126	74
Douglas Municipal	11,100	155,200	7%	0.00	0	66	40
Eagle Airpark	5,053	225,400	4%	0.00	0	98	59
Eloy Municipal	23,100	285,400	8%	0.00	0	121	71
Ernest A. Love Field	353,299	326,400	108%	0.60	2,358	101	61
Estrella Sailport	16,500	381,800	14%	0.01	10	117	53
Falcon Field	220,969	381,800	58%	0.31	1,195	117	53
Flagstaff – Pulliam	63,400	274,000	23%	0.10	107	116	70
Flying J Ranch	800	120,000	1%	0.00	0	51	31
Forepaugh	N/A						
Ganado (NA)	700	120,000	0%	0.00	0	51	31
Gila Bend Municipal	4,550	174,900	3%	0.00	0	71	54
Glendale Municipal	150,000	275,000	55%	0.29	740	117	53
Grand Canyon Bar-Ten	2,000	120,000	2%	0.00	0	51	31
Grand Canyon Caverns	700	120,000	0%	0.00	0	51	31
Grand Canyon National Park	164,179	156,000	105%	3.96	12,305	64	40
Grand Canyon West	0	120,000	0%	0.00	0	51	31
Grande Valley	N/A						
Greenlee County	6,650	126,300	5%	0.00	0	53	39
H. A. Clark Memorial Field	3,600	137,400	3%	0.00	0	54	38
Holbrook Municipal	4,650	267,400	2%	0.00	0	119	70
Kayenta (NA)	4,700	120,000	4%	0.00	0	51	31
Kearny	4,200	120,000	9%	0.00	0	51	31
Kingman	33,000	347,600	9%	0.00	0	148	89
Lake Havasu City Municipal	55,344	307,900	18%	0.16	102	131	79
Laughlin/Bullhead International	47,316	267,000	18%	0.12	108	118	59
Marana NW Regional	71,300	267,000	31%	0.20	254	119	70
Marble Canyon	2,340	100,000	2%	0.00	0	162	98
Memorial Airfield (NA)	25,500	100,000	26%	0.08	80	162	98

TABLE 6-2: ***Existing Airport Capacity and Delay – 2000 (continued)***

Facility Name	1998 Operations	Annual Service Volume	Volume to Capacity	Average Aircraft Delay Per Operation (min.)	Average Annual Airport Delay (hours)	Hourly Capacity	
						VFR	IFR
Nogales International	22,890	276,100	8%	0.00	0	125	73
Page Municipal	31,988	294,600	11%	0.00	0	126	74
Payson	25,000	267,000	9%	0.00	0	124	72
Pearce Ferry	1,100	120,000	0%	0.00	0	51	31
Phoenix Deer Valley	281,124	336,400	84%	0.42	1,902	143	54
Phoenix Goodyear	157,250	276,100	57%	0.31	810	117	53
Phoenix Sky Harbor International	537,822	475,000	113%	2.49	19,710	149	63
Pinal Airpark	10,368	195,000	5%	0.00	0	83	50
Pleasant Valley	48,000	120,000	40%	0.20	152	51	31
Polacca (NA)	5,300	120,000	4%	0.00	0	51	31
Rolle Airfield	4,900	120,000	4%	0.00	0	51	31
Ryan Field	157,659	355,000	44%	0.21	527	151	89
Safford Regional	14,750	286,700	5%	0.00	0	122	74
St. Johns Industrial Airpark	15,000	286,700	5%	0.00	0	122	74
San Carlos Apache	16,200	285,400	6%	0.00	0	121	71
San Manuel	1,000	120,700	1%	0.00	0	51	31
Scottsdale	182,153	294,600	62%	0.69	4,868	128	74
Sedona	41,000	276,100	15%	0.08	114	118	71
Seligman	1,100	120,000	1%	0.00	0	51	31
Sells (NA)	1,310	130,000	1%	0.00	0	54	33
Show Low Municipal	29,170	378,400	8%	0.00	0	161	97
Sierra Vista Muni/Libby AAF	49,651	367,400	14%	0.09	112	156	94
Stellar Airpark	41,020	120,000	34%	0.20	120	51	31
Sun Valley	750	120,000	0%	0.00	0	51	31
Superior Municipal	400	120,000	0%	0.00	0	51	31
Taylor	4,800	137,400	4%	0.00	0	54	33
Temple Bar	1,800	120,000	2%	0.00	0	51	31
Tombstone Municipal	350	105,900	1%	0.00	0	49	29
Town of Springerville Municipal	8,580	286,700	3%	0.00	0	122	74
Tuba City (NA)	7,000	120,000	6%	0.00	0	51	31
Tucson International	266,428	380,000	70%	0.54	2,224	162	98
Tuweep	100	120,000	1%	0.00	0	51	31
Valle Airport	N/A						
Whiteriver (NA)	1,730	230,000	1%	0.00	0	98	59
Wickenburg Municipal	18,377	267,000	7%	0.00	0	119	70
Williams Gateway	228,313	410,000	57%	0.65	6,098	174	105
Window Rock (NA)	2,050	120,000	2%	0.00	0	51	31
Winslow-Lindberg Regional	27,650	286,700	10%	0.00	0	122	74
Yuma International/MCAS Yuma	172,975	347,600	50%	0.71	3,150	148	89

Legend:
NA – Native American

Facility Performance Measure 4

The number of airports that generate INM noise contours greater than 65 DNL that extend off airport property.

Calculation
Examination of airport noise impact data overall showed a lack of consistent up-to-date information. This made it difficult to evaluate which airports generate noise contours greater than 65 DNL that extend outside airport property boundaries. To overcome this problem, it was decided to use accepted parameters that could identify airports that have the potential to fall within this category. The parameters chosen are based on FAA Order 5050.4A, "Airport Environmental Handbook." In this Order, it is assumed that forecast operations that do not exceed 90,000 annual propeller operations or 700 adjusted jet operations resulting in cumulative noise levels not exceeding 60 Day/Night Level (DNL) more than 5,500 feet from the start of takeoff roll or 65 DNL on the runway itself. The parameters were then applied against current activity and fleet mix at existing airports to determine the number of airports with the potential for off-airport noise compatibility impacts. This number was calculated to be 16 and illustrated in Exhibit 6-2.

It should be noted that this measure of system noise impacts does not indicate the existence or nonexistence of a noise problem at a particular airport, and is the reason why individual airports were not identified. The Cessna Citation 500, the Gates Learjet 35A, and other similar jet aircraft producing equivalent or less levels of noise are quieter than many propeller aircraft under 12,500 pounds. Noise problems at airports are dependent on surrounding land uses and community attitudes. A noise compatibility analysis requires a detailed study beyond the scope of this report. This performance measure was designed only to reflect the growing potential for airport/community noise conflicts over time.

Facility Performance Measure 5

The number of system airports without adequate utilities (electricity, telephone, and water).

Calculation
All system airports should have basic services including water, electricity, and a telephone for closing out flight plans, contacting weather information services, and emergencies. Information from airport sponsor surveys indicate that for the primary system airports (those which have been received) all airports currently have adequate utilities. The number of secondary system airports without telephone, electricity, or water totaled 29. Table 6-2 summarizes this information for the statewide secondary system of airports.

EXHIBIT 6-2: ***Airports with 65 DNL - Noise Levels Off Airport Property***

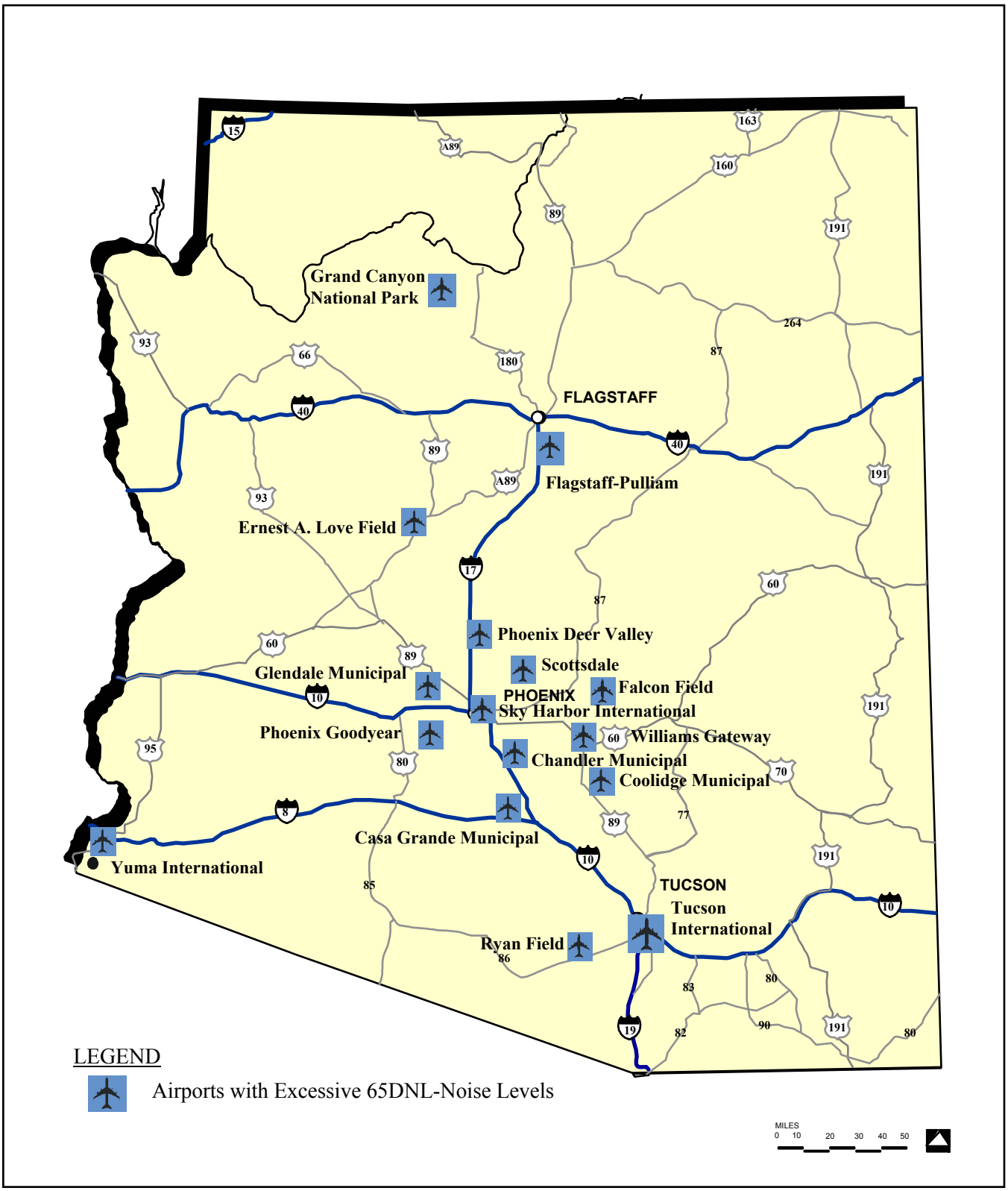


TABLE 6-2: *Basic Utility Needs*

Facility Name	Water	Telephone	Electricity
Ajo Municipal	■	□	■
Bagdad	□	■	■
Bowie	□	□	□
Cascabel	□	■	■
Chinle Municipal	□	□	□
Flying J Ranch	□	□	□
Ganado (NA)	□	□	□
Grand Canyon Bar-Ten	□	□	□
Grand Canyon West	□	□	□
H.A. Clark Memorial Field	□	■	■
Kayenta (NA)	□	□	□
Kearny	□	□	□
Memorial Airfield (NA)	□	□	□
Mogollon Airpark (ERA)	□	□	□
Pearce Ferry	□	□	□
Pleasant Valley	□	□	□
Polacca (NA)	□	□	□
Rolle Airfield	□	□	□
San Manuel	□	□	□
Sedona	□	□	□
Seligman	□	□	□
Sells (NA)	□	□	□
Somerton	□	□	□
Sun Valley	□	□	□
Superior Municipal	□	□	□
Temple Bar	□	□	□
Tombstone Municipal	□	□	□
Tuba City (NA)	■	■	□
Tuweep	□	□	□

■ Has utility in place
□ Does not have utility in place
N/A Not Applicable
NA Native American

Facility Performance Measure 6

The number of airports with no close-in obstructions (within the 200 feet primary surface) and where all FAR Part 77 approach obstructions are marked (not including trees and roads).

Calculation

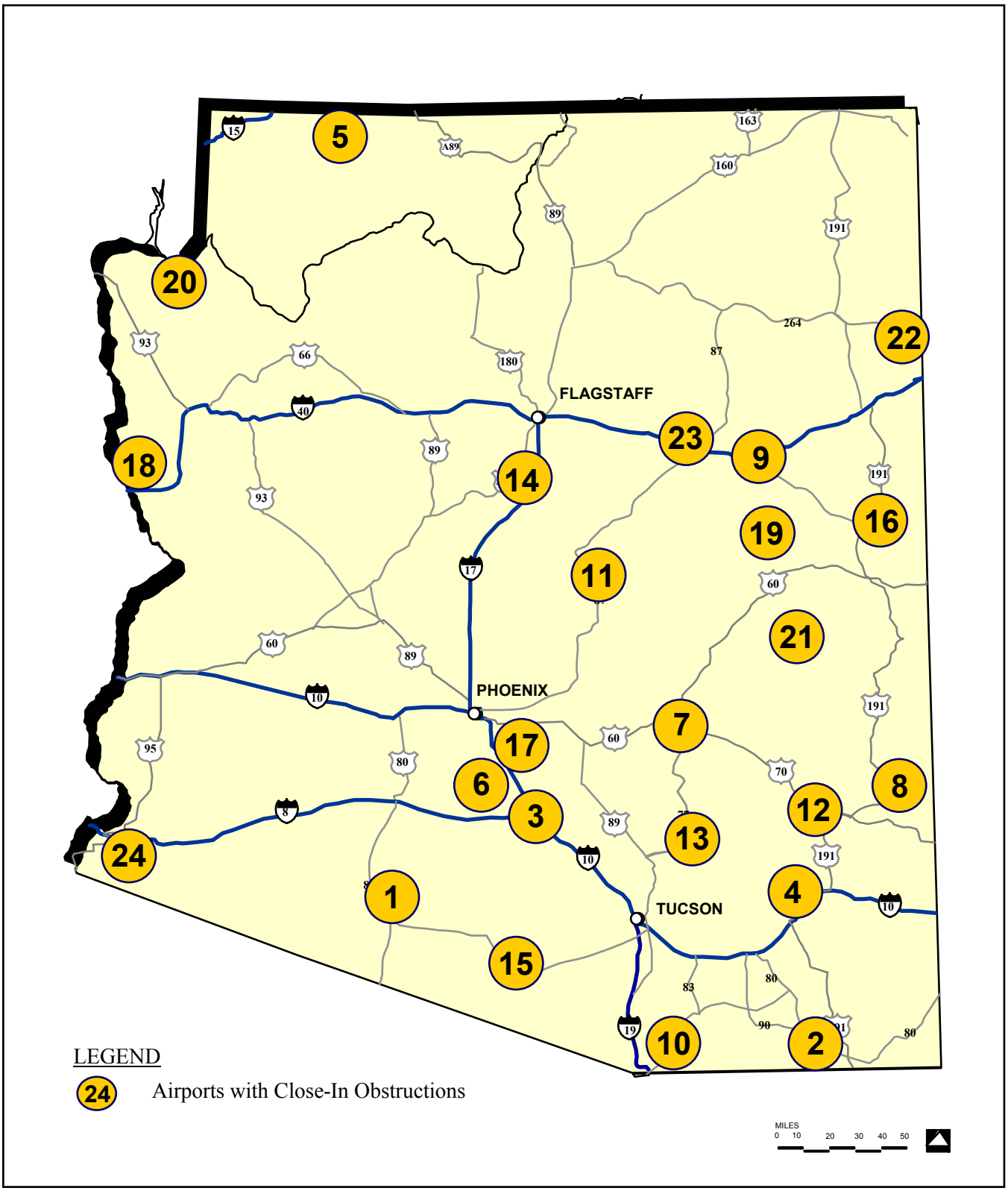
Federal Aviation Regulations Part 77, Objects Affecting Navigable Airspace, define the airspace around an airport that should be kept clear of obstructions to conduct safe operations. Part 77 surfaces are related to the type of approach and departure procedures in effect at a particular airport. Obstructions within the defined Part 77 approach surfaces will generally result in the FAA raising approach minimums or restricting the type of approaches or departures that can be conducted on a runway where the obstruction(s) have been identified. This could result in the displacement or relocation of a runway threshold, thus reducing the usable length of the runway for takeoffs and/or landings, or could result in an airport not able to accommodate an instrument approach procedure.

At a minimum, to maintain the efficiency of the state's system of airports, close-in obstructions should be eliminated where possible. Airports with close-in obstructions have been identified through examination of FAA 5010 Airport Master Record forms, and through airport sponsor surveys. Airports without 5010 forms, or did not respond to the sponsor survey, were not included.

The number of airports identified as having no close-in obstructions that would affect airport operation is 63, compared with only 39 in the 1995 SANS. This is a significant improvement in this performance measure since the last SANS study. The following is a list of affected airports with close-in obstructions preceeding the illustration of these airport in Exhibit 6-3.

1. Ajo Municipal
2. Bisbee Municipal
3. Casa Grande Municipal
4. Cochise County Airport
5. Colorado City Municipal
6. Estrella Sailport
7. Globe-San Carlos Regional
8. Greenlee County
9. Holbrook Municipal
10. Nogales International
11. Payson
12. Safford Regional
13. San Manuel
14. Sedona
15. Sells (Nat. Amer.)
16. St. Johns Industrial Airpark
17. Stellar Airpark
18. Sun Valley
19. Taylor Municipal
20. Temple Bar
21. Whiteriver (Nat. Amer.)
22. Window Rock (Nat. Amer.)
23. Winslow-Lindberg Regional
24. Yuma International

EXHIBIT 6-3: ***Airports with Close-In Obstructions***



Facility Performance Measure 7

The number of total airports in the state with no or minimal shared airspace and/or restrictions under Visaul/Instrument flight rules (VFR-Class A, B aircraft - - IFR – Class C, D aircraft). This facility performance factor was not evaluated in the 1995-SANS.

Calculation
In this analysis, we look at all the airports in the system and delineate the radar airspace requirements for each airport and identify how many airports have problems and significant overlaps. This allows an identification of congested airspace and how many problem airports are in the system. The analysis identified 40 airports in the system as having significant shared or restricted airspace that affect airport operations or delay.

Service Level Performance Measure 8

Percent of communities in the State with a population greater than 5,000 within 60 minutes driving time of a commercial service airport, or 90 minutes of a major metropolitan airport (ie., Phoenix Sky Harbor International and Tucson International Airports).

Calculation
Convenient access to the national scheduled commercial airline network is an important economic asset to the state and to individual communities. It benefits executives and salespersons in their inter-city travels, business managers interested in carrying lower inventories, suppliers in meeting the demand for perishable goods, communities in attracting new industry, and vacationing travelers.

Convenient access to an airport providing scheduled commercial service is generally considered to be within the range of 60 minutes driving time of the airport, or 90 minutes of a major metropolitan airport. To determine the adequacy of the existing system in providing convenient scheduled air service to Arizona communities, lines representing driving times (isochrones) were drawn around airports providing scheduled airline service.

Fifty-one cities with a population of 5,000 or greater were identified in the state (Exhibit 6-4) compared with 50 cities in the 1995-SANS. Based on the analysis described above, all but three (3) of these communities were within 60 minutes of an airport providing regularly scheduled service compared with only one in the 1995-SANS. Exhibit 6-5 graphically portrays commercial service airport service areas within the state.

EXHIBIT 6-4: ***Populations Greater than 5,000 People***

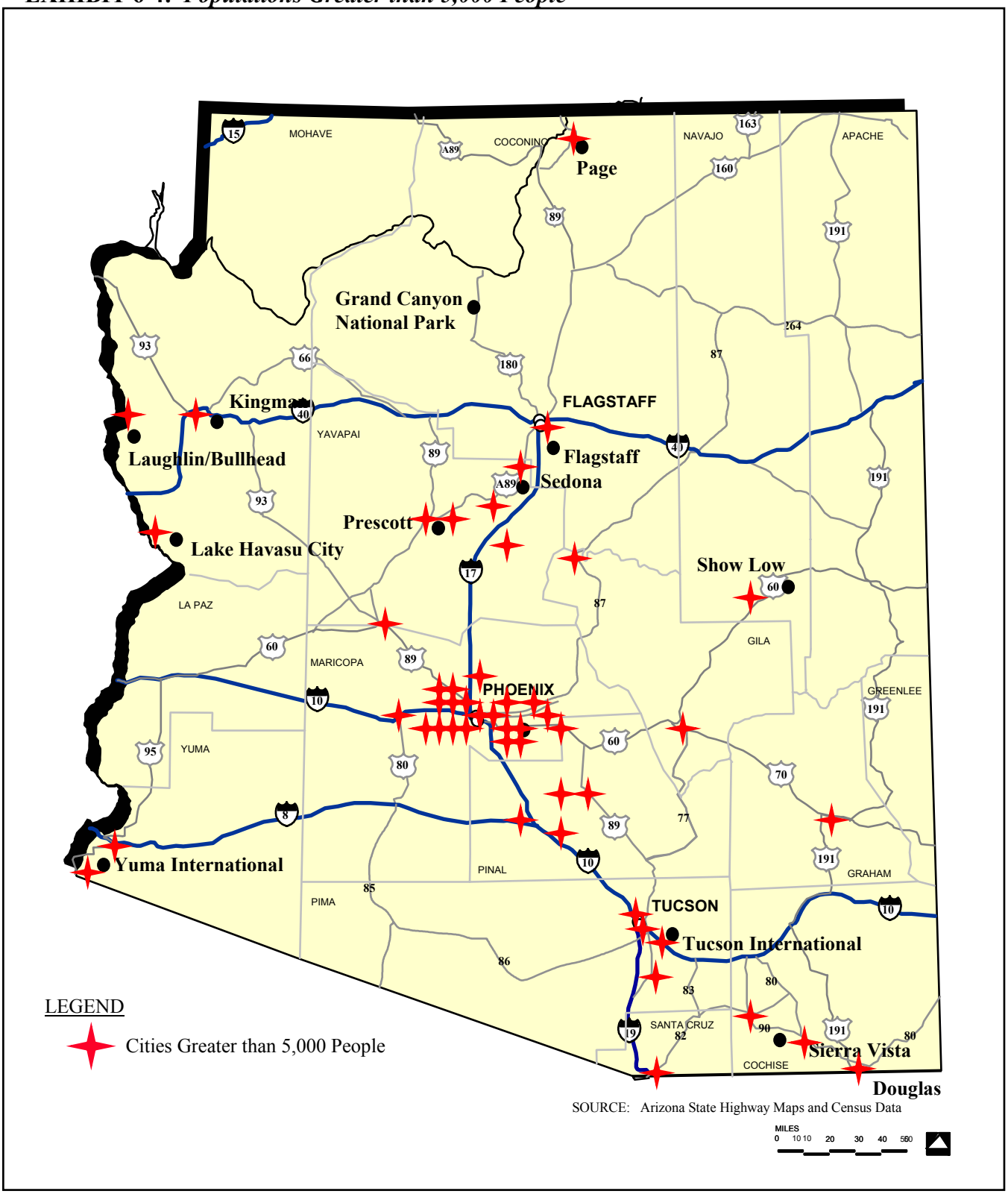
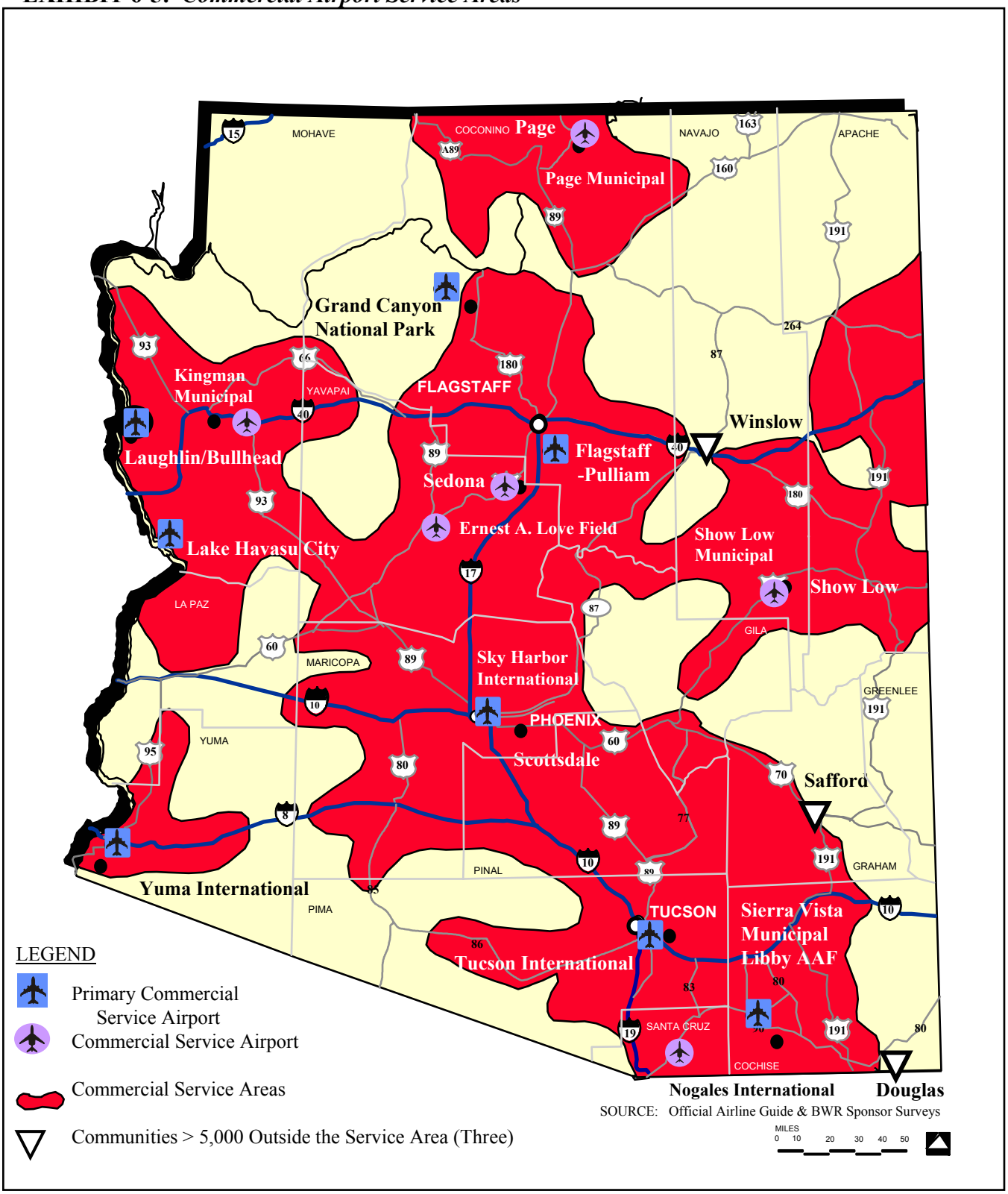


EXHIBIT 6-5: *Commercial Airport Service Areas*



Service Level Performance Measure 9

Percent of communities in the State with a population greater than 1,000 within 30 minutes driving time of a general aviation airport.

Calculation

The advantages of general aviation have received less publicity than those of commercial and military aviation. General aviation activity includes all civil aviation activity except that of certified air carriers. A large number of general aviation activities provide benefits to the public, for example: law enforcement, rescue, medical aid, air cargo, aerial application, air taxi and air ambulance service, flight training, and business and corporate transportation. Each of these activities contributes significantly toward linking the region with other markets.

The types of aircraft used in general aviation activities cover a wide spectrum. They range from corporate, multi-engine jet aircraft piloted by professional crews to home-built single-engine piston planes, balloons, and dirigibles. Convenient access to an airport providing general aviation service is generally considered to be within the range of 30 minutes driving time of the airport. To determine the adequacy of the existing system in providing convenient access to general aviation facilities, 30 minute isochrones were drawn around public use airports serving the study area.

No communities with populations greater than 1,000 (Exhibit 6-6) fell outside a 30-minute service area. As can be seen in Exhibit 6-7, significant overlap exists in most parts of the region in terms of 30-minute service areas for general aviation airports. Therefore, it can be concluded that in terms of general aviation airport locations, the state is well-served. Many existing airports, however, are in need of improvements to their facilities based on state and federal development standards. There is no change in this performance measure since the 1995-SANS evaluation.

EXHIBIT 6-6: ***Populations Greater than 1,000 People***

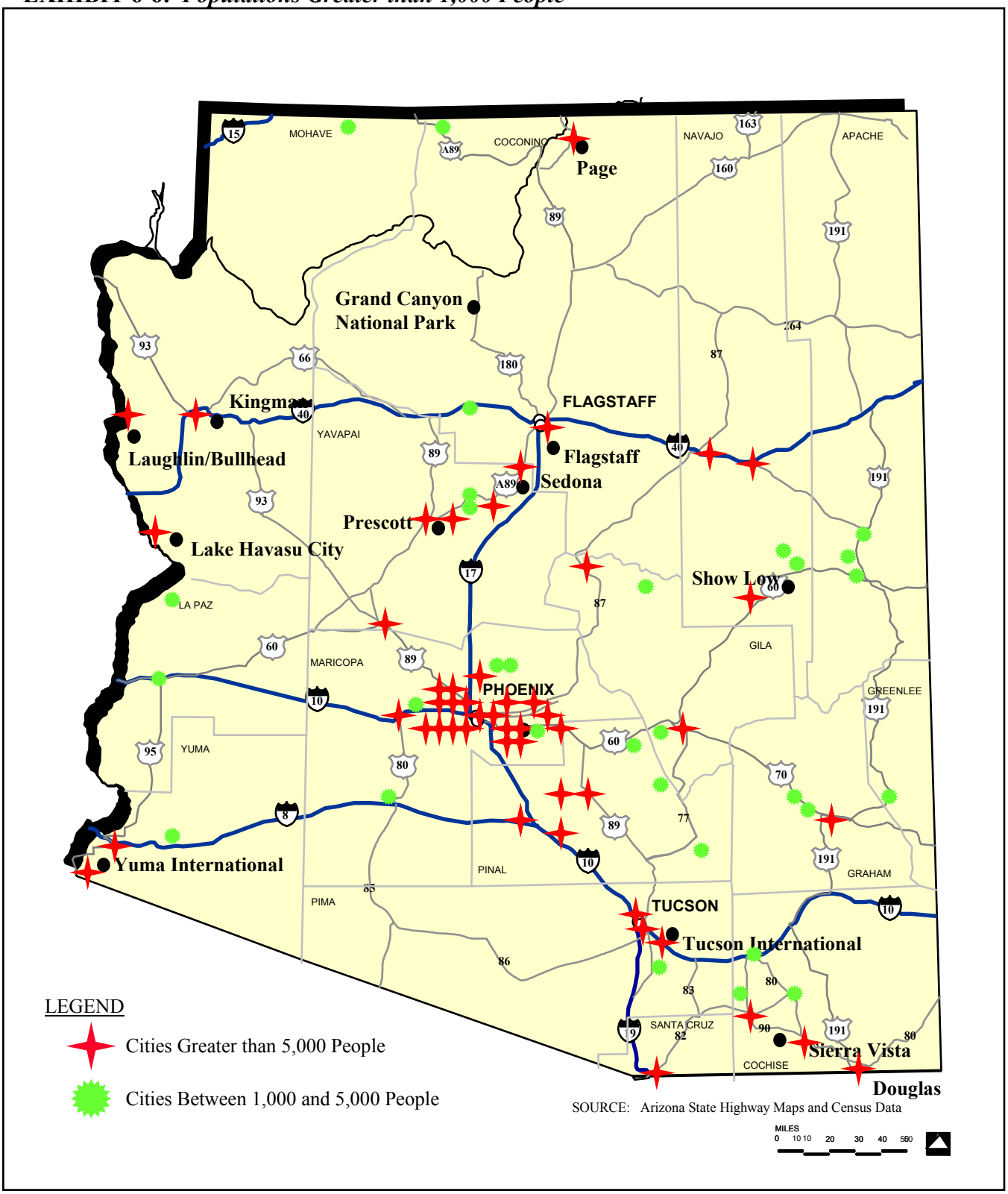
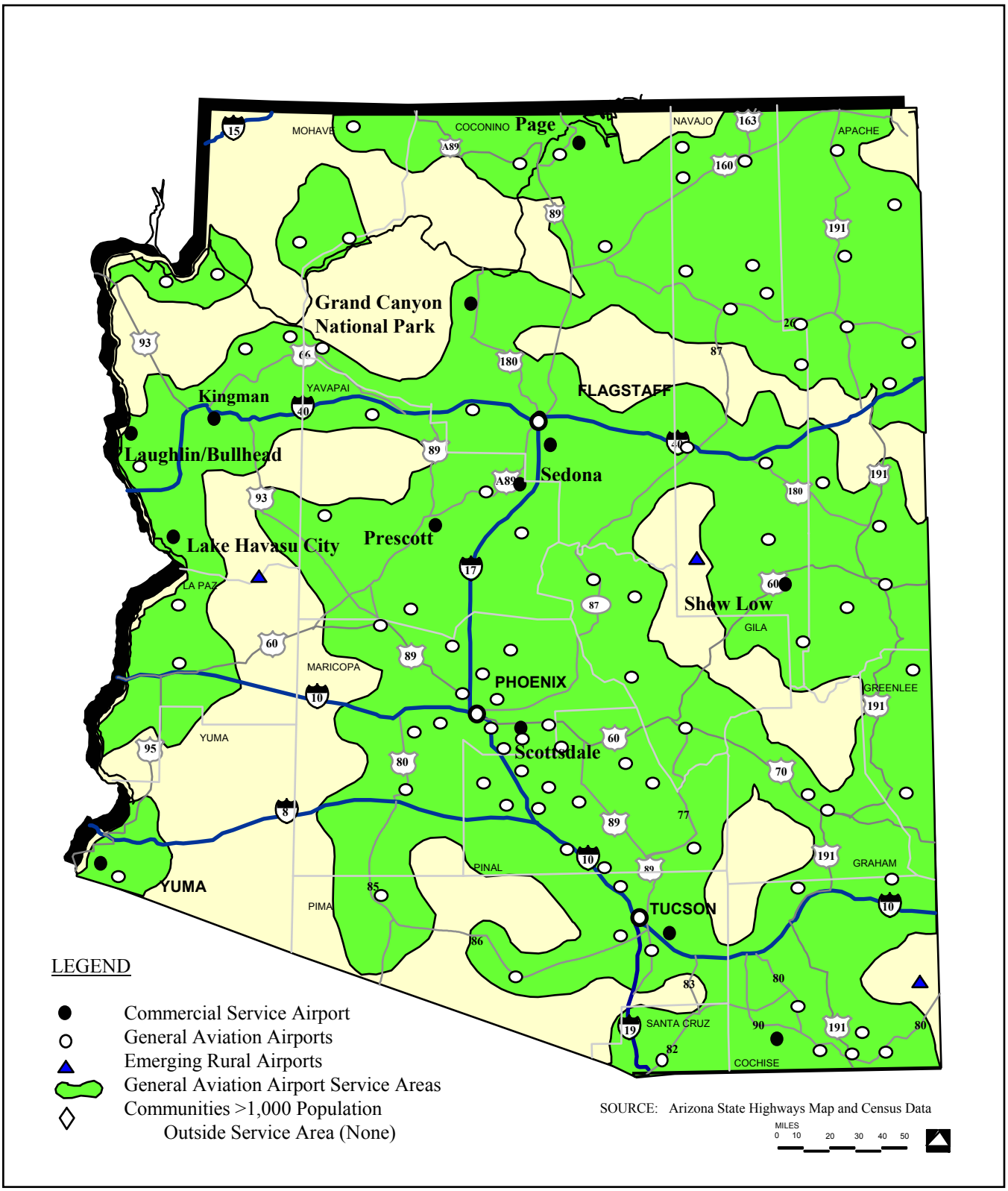


EXHIBIT 6-7: ***General Aviation Service Areas***



Service Level Performance Measure 10

Percent of communities in the State with a population greater than 15,000 within 30 minutes driving time of a general aviation airport that can accommodate large general aviation aircraft (ARC B-II) and has Instrument Meteorological Conditions (IMC) capability.

Calculation

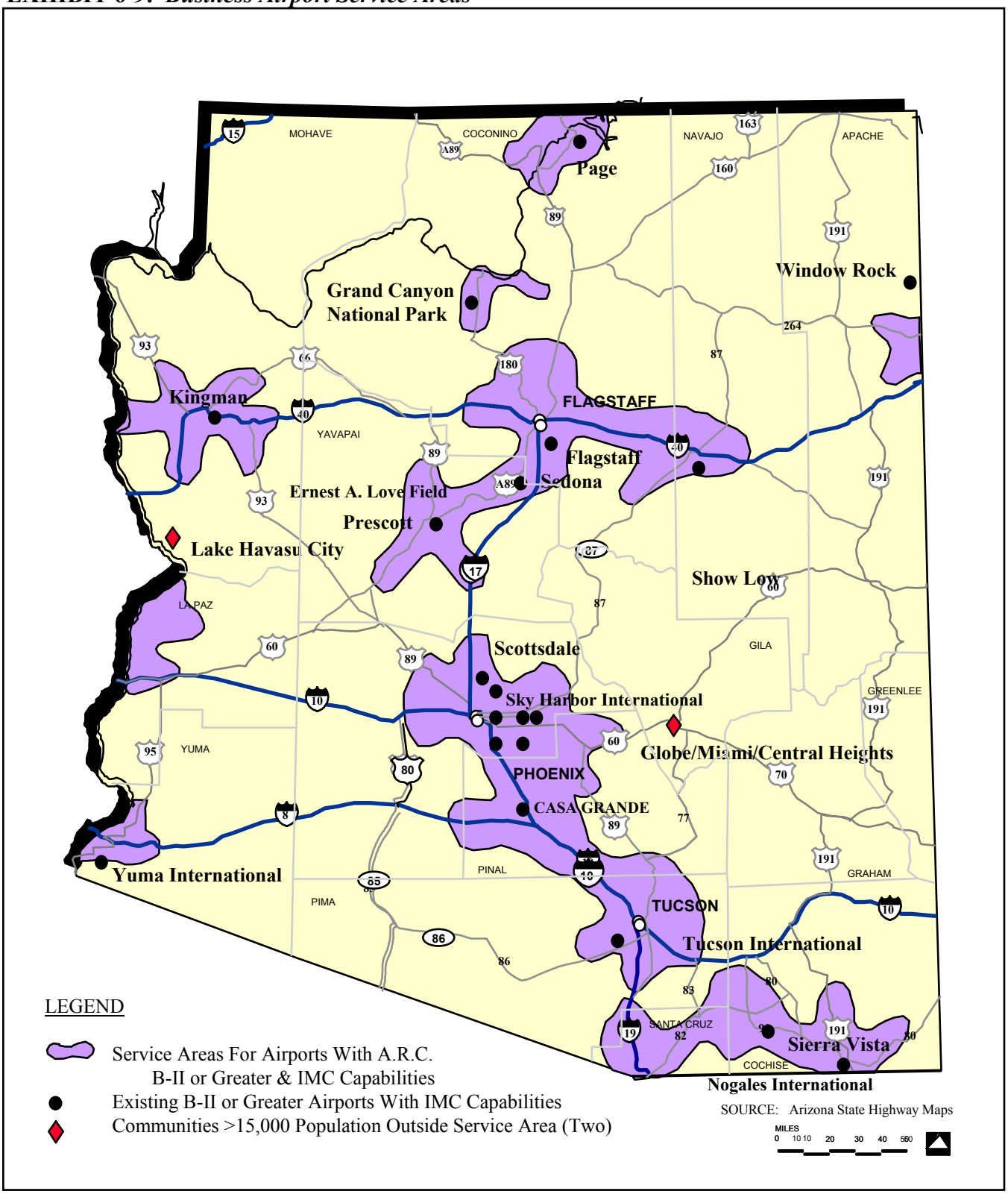
The airport's role in providing access to the national air transportation system is important for attracting economic development to a community. Few major corporations will select a location where their aircraft cannot operate. Thus, any community without convenient and adequate airport facilities nearby will be at a disadvantage in competing for business investment and employment.

This analysis identifies those places with a population greater than 15,000 that are more than 30 minutes from an airport that can accommodate business-type general aviation aircraft. Business aircraft, for the purposes of this analysis, have been defined as aircraft with landing speeds of up to 120 knots, and wingspans of up to 78 feet. Representative aircraft include Beech King Air, Cessna Citation, Piper Cheyenne, and Jetstream 31 (Airport Reference Code B-II).

Exhibit 6-8 identifies 20 communities in the state with a population greater than 15,000. Exhibit 6-9 indicates that only two (2) areas do not fully meet the criteria for this performance measure -- Lake Havasu City and the Globe/Miami/Central Heights region. The only deficiency is that neither of the airports servicing these communities has IMC capability. This performance measure is unchanged since the evaluation performed in the 1995-SANS.

EXHIBIT 6-8: ***Populations Greater than 15,000 People***

EXHIBIT 6-9: ***Business Airport Service Areas***



Service Level Performance Measure 11

Percent of hospitals in the State within 30 minutes driving time of a general aviation airport with Instrument Meteorological Conditions (IMC) capability, on-site weather reporting, and jet fuel availability.

Calculation

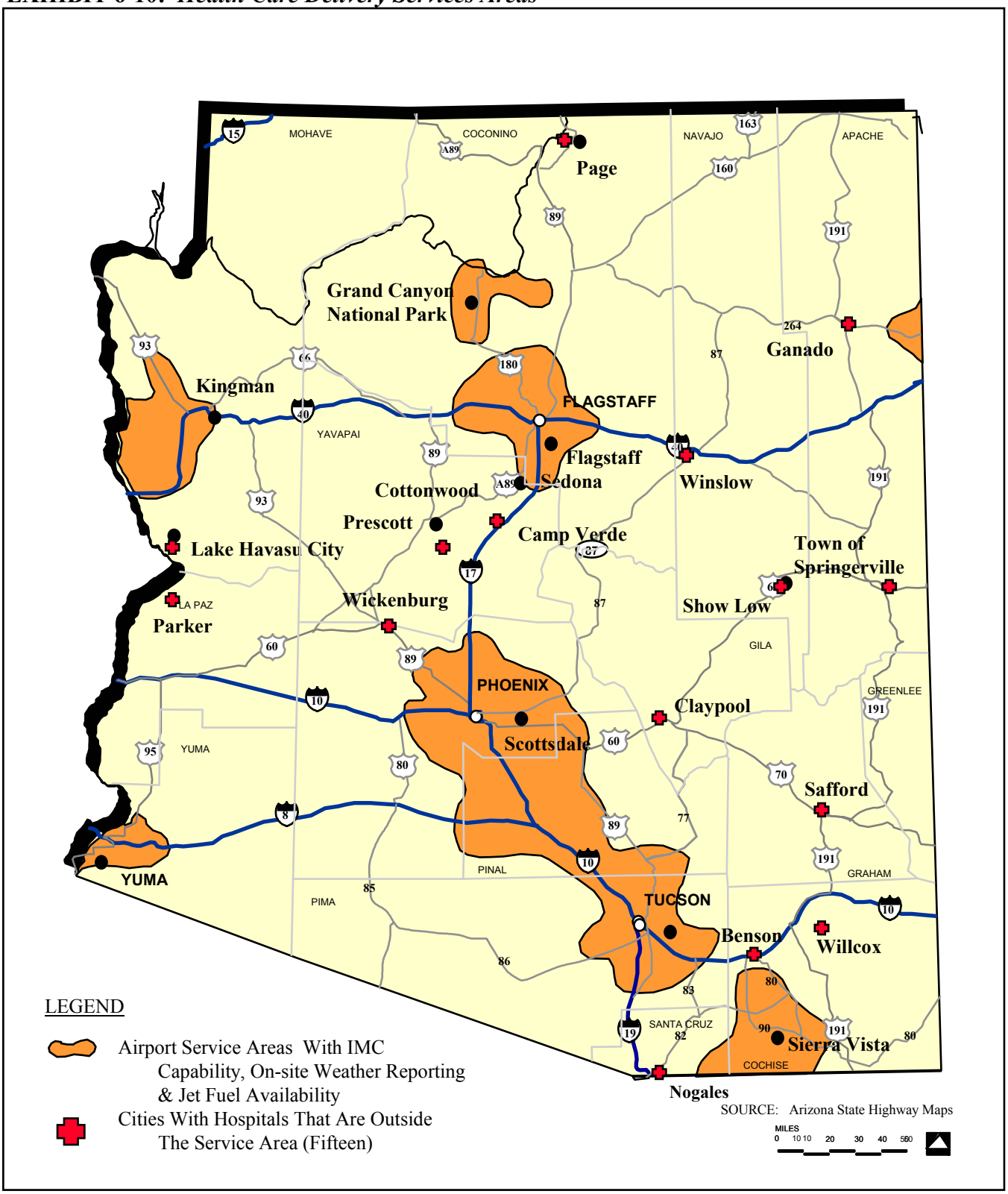
Most community hospitals and health clinics in rural Arizona have only limited facilities and staff for routine health care. These facilities rely on access to larger medical facilities primarily in Phoenix and Tucson for specialized care or emergency trauma cases. A safe and reliable air ambulance service is, therefore, an important part of this rural health care system.

To measure the performance of the existing airport system to support this type of activity, airports serving the medical facilities in rural Arizona were evaluated as to whether they provided three basic services: (1) instrument meteorological conditions (IMC) takeoff and landing capability; (2) on-site weather reporting capability; and (3) aviation fuel availability. These features were identified as important to the basic reliability of the system.

IMC capability, as represented by a nonprecision instrument approach, is important to the ability of air ambulances to land and take off in marginal or poor weather. On-site weather reporting capability allows flight crews to anticipate possible delays and avoid problems due to thunderstorms or other local weather conditions. Lastly, the availability of aviation fuel is an important factor that relates directly to range and payload of an aircraft utilizing an airport. Aircraft serving medical centers located near airports without adequate fueling facilities must limit flight time and number of passengers in order to carry enough fuel for the return flight to base.

Of the 82 community clinics and general hospitals identified in the study area, as shown in Exhibit 6-10, 18 percent, or 15 hospitals/clinics, were located over 30 minutes from an airport providing all three of the basic services discussed above. This is a decrease of one percent since the 1995-SANS analysis recorded 17% of hospitals in Arizona were located in excess of 30 minutes from an airport.

EXHIBIT 6-10: ***Health Care Delivery Services Areas***



Service Level Performance Measure 12

The number of major recreational areas in the state within 30 minutes driving time of a general aviation airport.

Calculation
The extent to which recreational areas are served by an airport within 30 minutes driving time is high. This performance measure also required the use of isochrones around all applicable airports. All recreational areas attracting over 50,000 annual visitors were identified and evaluated to determine if the main usage area was within 30 minutes driving time. Of the 29 areas identified, al, except Alamo Lake in La Paz County were considered well-served, for a performance rating of 97 percent. This is shown in Exhibits 6-11 and 6-12. According to the *Arizona Recreational Airports System Plan*, a site and recommended facilities have been planned for this area. This performance measure is unchanged since the evaluation performed in the 1995-SANS.

Economic Performance Measure 13

The dollar cost of average aircraft annual delay to Arizona airport system users.

Calculation
The annual dollar cost of delay for airport users was estimated at $39.1 million for the existing system. This was calculated by applying block hour costs of operating an aircraft to the amount of average aircraft annual delay experienced in the system. Block hour cost is a common industry cost measurement that is calculated using the total costs of aircraft maintenance, insurance, crew expense, and other items to determine the hourly cost of aircraft operation. This cost does not consider lost passenger time, disruption to airline schedules, or any other intangible factors. The block hour costs used in the calculation was $1,375 for Phoenix Sky Harbor and Tucson International Airports; $260 per hour for Commercial Service and larger (ARC C-III) general aviation airports, and $130 an hour for aircraft used at other airports in the state. The annual cost of delay increased by $9.0 million when compared with the cost calculated in the 1995-SANS.

The block hour costs for Tucson and Phoenix Sky Harbor are based on those block hour costs reported in the Phoenix Sky Harbor Airport Capacity Enhancement Plan, adjusted to 2000 dollars. Block hour costs for all other airports were estimated based on block hour costs for single engine piston, multi-engine piston, and corporate jet aircraft block hour costs. Block hour costs for commercial service and larger general aviation airports were set higher to reflect the type of fleet mix in use at these airports. It should be noted that the cost of delay identified in this performance measure is for comparison purposes only and may not reflect the true cost of system delay.

EXHIBIT 6-11: ***Recreation Areas***

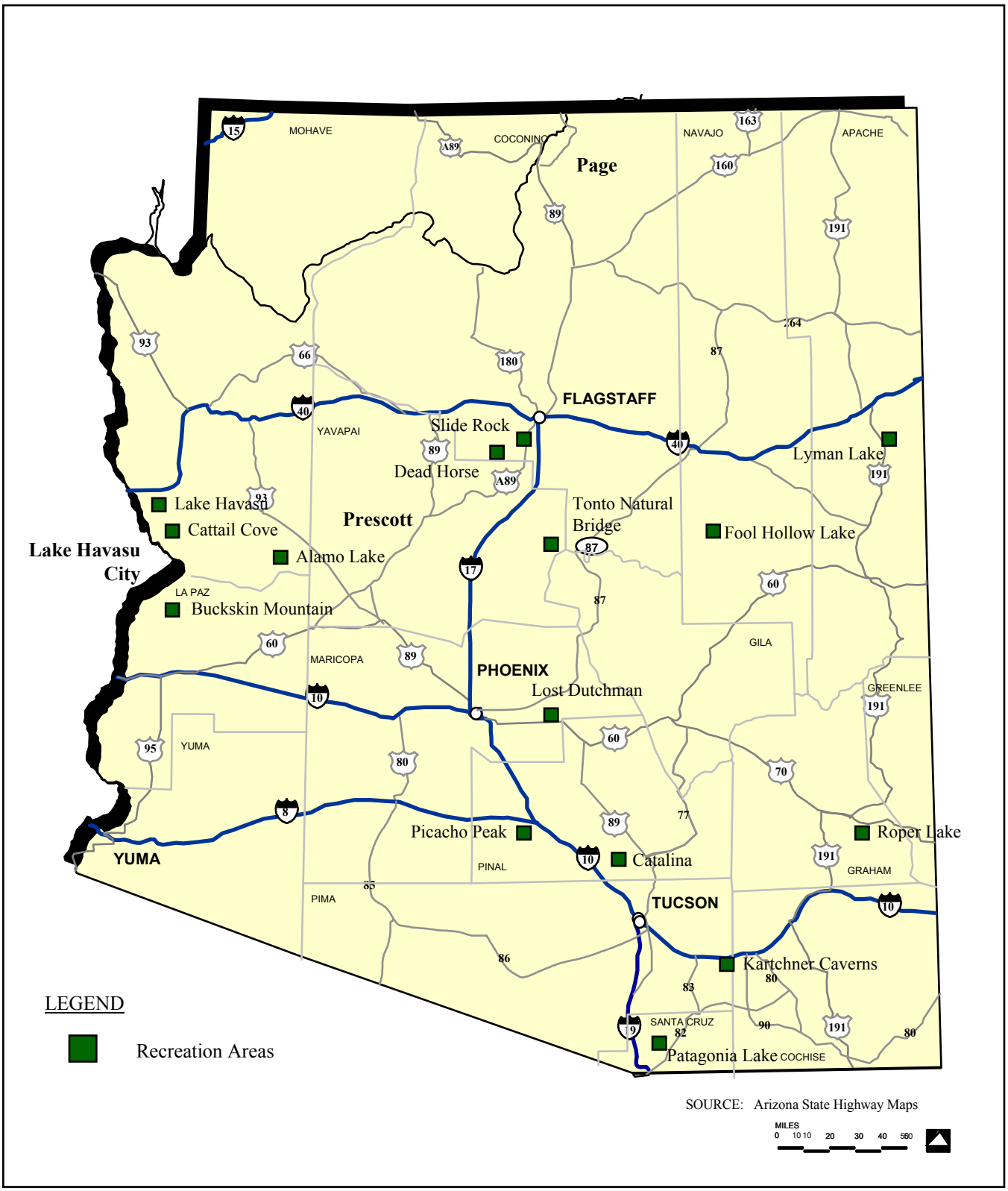
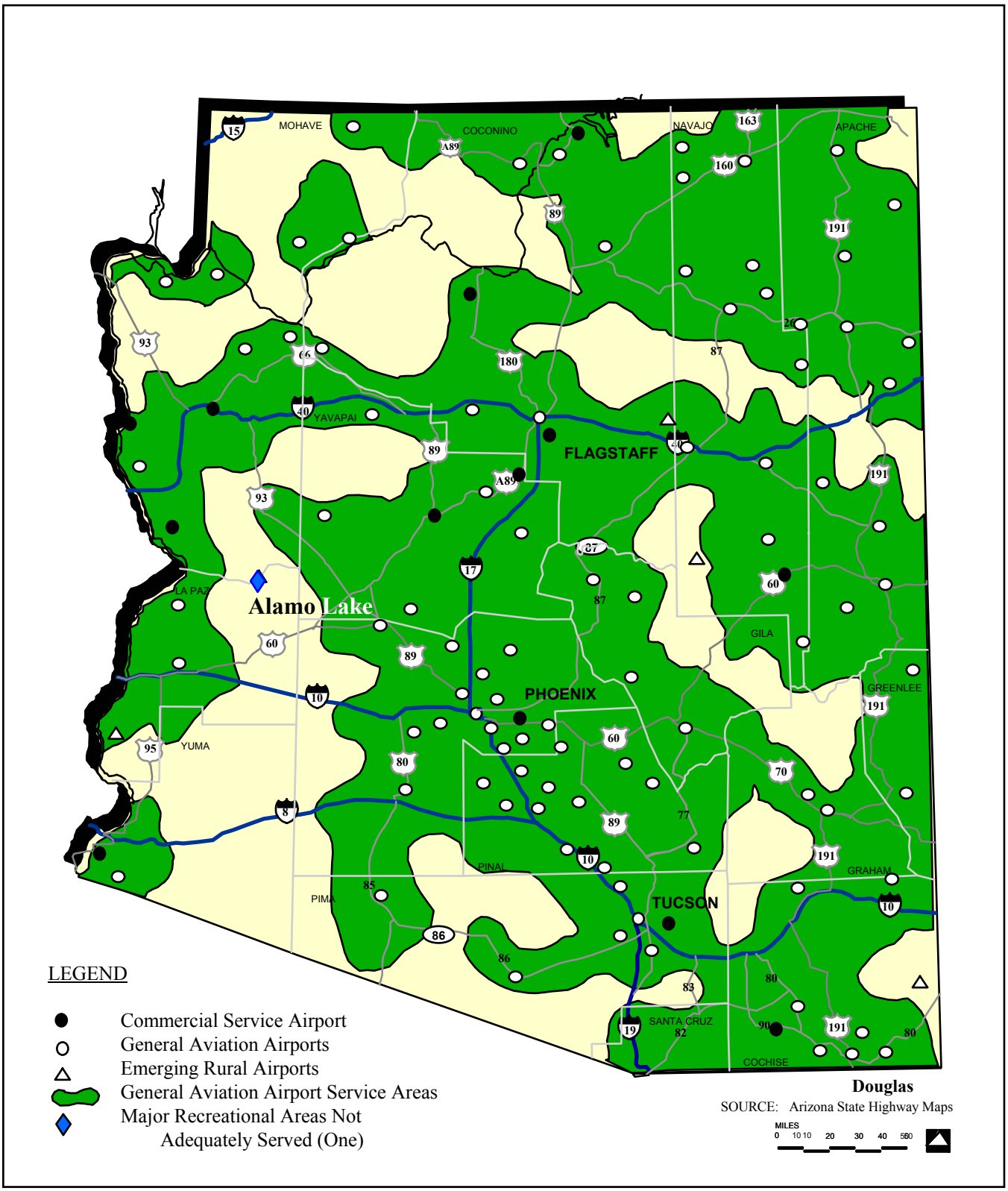


EXHIBIT 6-12: ***Recreational Service Areas***



Economic Performance Measure 14

Dollars of economic impact on the state from aviation.

Calculation

A primary indicator that may be measured and cited as evidence of an airport system's importance is its economic impact. Economic impacts are the statewide economic activities, employment, and payrolls that can be attributed directly and indirectly to the operation of system airports. They describe the importance of aviation as an industry.

Profit, or the difference between expenses and revenues, is a valid measure of the viability of a private business. However, public airports are generally operated as public utilities, with the provision of service rather than profit as the primary motive. Thus, profit is not always relevant to the economic significance of an airport system. The calculation of direct and indirect contributions of the system to the economy is a more relevant measure.

Direct impacts are the consequence of economic activities carried out at system airports by airlines, airport management, fixed base operators, and other activities with direct involvement in aviation. Strictly speaking, direct impacts should represent economic activities that would not have occurred in the absence of an airport system. If it were determined that without the system some on-site airport employees would be doing comparable work elsewhere in the state without displacing other workers, their employment should not be part of the system's contribution to state economic activity.

Indirect impacts derive from off-site economic activities that are attributed to the airport system. These activities include services provided by travel agencies, hotels, restaurants, and retail establishments. These enterprises, like airport businesses, employ labor, purchase locally produced goods and services, and invest in capital expansion and improvements. Indirect impacts differ from direct impacts in that they originate entirely off-site.

To determine the impact of Arizona's system of public use airports we used the formulas developed in the publication *Estimating the Regional Economic Significance of Airports* prepared by the United States Department of Commerce. Economic impact studies for Phoenix Sky Harbor and Tucson International were also considered. For the air carrier contribution to direct and indirect impacts, $296 per enplanement was calculated, for air cargo, $834 per enplaned ton, and for general aviation activity, $140 per operation. These figures are state averages in constant 2000 dollars. For 1999, this represented $6.3 billion in economic impact by aviation to the state economy, an increase of $2.2 billion since the economic impact evaluation performed in the 1995-SANS.

Economic Performance Measure 15

The cost ratio of aviation infrastructure to total number of statewide annual enplaned passengers and annual aircraft operations.

Calculation
The cost ratio of 1999 aviation infrastructure improvements to total number of statewide 1999 annual enplaned passengers was approximately 4:1; the ratio to annual aircraft operations was approximately 15:1. These numbers were calculated to establish a baseline condition for the existing system compared with a baseline of 5:1 and 17:1 for the 1995-SANS.

Economic Performance Measure 16

The total dollar cost from aircraft delays associated with airport airspace congestion.

Calculation
Starting with an assessment of the PHOCAP (practical hourly capacity) of the airport, the anaylsis concentrates on quantifying the costs of the different types of aircraft which are delayed. From the inventory and forecasts of airport usage, the total delays have been estimated by types of aircraft, using hourly operating costs, and quantifying it at the system level by a cumulative evaluation of the individual airports. In 1999, these costs totalled about $8.2 million, related strictly to what could be described as airspace congestion. This is over and above those costs of delay due to airfield capacity issues. These costs are identified in Table 6-3. This performance factor was not evaluated in the 1995-SANS.

6.3 PERFORMANCE EVALUATION MATRIX

Presented in Table 6-11 is a performance evaluation matrix that summarizes the performance measures and relative performance scores of the existing aviation system. With the addition of performance scores calculated for each future investment scenario (at the completion of Element 7 - Needs Scenarios), it can be used to compare future system performance with the existing baseline case. The task of choosing a preferred strategy will be one of prioritizing the performance measures and evaluating the performance of each scenario against funds allotted for future system development.

In looking at Table 6-3 and Exhibit 6-13, which graphically present the data, it is easy to see the less effective areas of performance within the existing aviation system by looking at the 1999 baseline condition data and percentages. For example, only 51 percent of existing system airports currently meet state and federal development and planning standards and only 72 percent of the airports currently have been identified as having no close-in obstructions that adversely affect airport operation. At the same time, 100 percent of all primary system airports currently have adequate utilities, but with the secondary system included, only 64 percent of the total system is considered adequately served.

On the service side, only 82 percent of all hospitals in the state are served within 30 minutes driving time of a general aviation airport with IMC capabilities, on-site weather reporting, and

fuel availability and 90 percent of communities are served by business-use type airports. With respect to scheduled air service, approximately 94 percent of all communities with a population of over 5,000 are within 60 minutes driving time of an adequate commercial service airport.

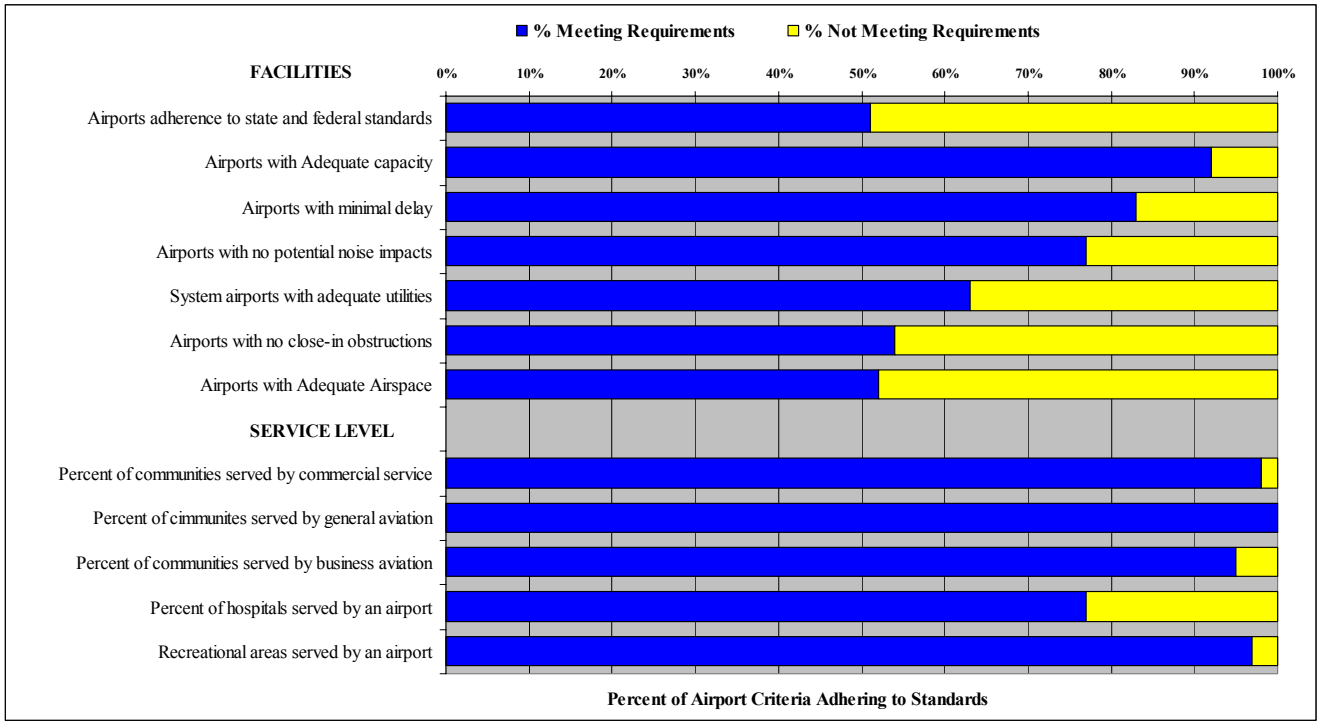
With this information, those areas of performance which are most in need of improvements can be readily identified and related directly to the issues, goals, and objectives outlined at the outset of the study. Policy decisions can then be made as to where to focus monetary resources, and the results can be measured in relation to the increased system performance they provide. This summary is the basis for the selection of system-wide improvements and individual projects at system airports.

TABLE 6-3: ***Performance Measure Comparison of the State Aviation System – 1995 to 2000***

PEFORMANCE MEASURE		1995 SANS	2000 SANS	% - CHANGE
Facilities				
1	Airports meeting Planning Standards	57%	51%	-6%
2	Airports with adequate capacity	92%	92%	No Change
3	Airports with minimal aircraft delay	2639 hrs	2253 hrs	7%
4	Airports with no/minimal Noise Impacts	84%	77%	-8%
5	Airports with adequate Utilities	65%	64%	-1%
6	Airports with no close-in Obstructions	38%	73%	35%
7	Airports with no significant/restricted shared airspace	N/A	54%	N/A
Service Level				
8	Percent of communities with commercial air service	98%	94%	-4%
9	Percent of communities served by general aviation	100%	100%	No Change
10	Percent of communities served by business aircraft	95%	90%	-5%
11	Percent of hospitals served by an airport	80%	82%	2%
12	Recreational areas served by an airport	97%	97%	No Change
Economic				
13	Cost of Average Aircraft Annual Delay	$28.5 Million	$39.1 Million	25%
14	Aviation Economic Impact	$4.1 Billion	$6.3 Million	35%
15A	Cost ratio of enplaned passengers	5:1	4:1	Decreased
15B	Cost of ratio of annual aircraft operations	17:1	15:1	Decreased
16	Cost of Aircraft delays	N/A	$8.2 Million	N/A
Total System Cost		$45.0 Million	$60.0 Million *	25%

Legend:
* = Represents a one-year average for comparison
N/A – Not Applicable – new performance measure
NC – No Change

EXHIBIT 6-13: *Comparison of Performance Levels 1995 to 2000*



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